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706.003PA**Remarks:**

Claims 1 to 30 remain in this application and, as amended, are presented for reconsideration. Claims 21 to 30 have been provisionally withdrawn subject to a restriction requirement, which applicant respectfully traverses.

Page 14 of the specification has been amended to correct a typographical error. No new matter is involved.

Applicant respectfully urges that Claims 21 to 30, drawn to the UHT pasteurizer apparatus, should remain in this application together with Claims 1 to 29, which are drawn to the process of pasteurization that employs the apparatus.

Examiner argues that the apparatus of Claims 21 to 30 can be used to practice a materially different process from that recited in Claims 1 to 20. Here, Examiner states: "In this case invention II [Claims 21 to 30] is capable of performing a function other than that described in the process claims. Such a function is the high temperature treatment of non-food material. Also, the process of group I [Claims 1 to 20] can be practiced by a materially different apparatus, for instance a device without a balance tank."

Applicant urges that these reasons for restriction are error. Applicant is unaware of any UHT pasteurization process that would be employed for any non-food, i.e., industrial liquid (perhaps a lubricant? or a fuel?), and urges that the Examiner's given example is only conjectural. Moreover, if the process were carried out in the claimed apparatus on a non-food liquid material, it is not understood how that process would be different in any *material* way. Here Examiner has supplied no patents, publications or other supporting authorities on these points. As to the "balance tank" argument, Applicant points out that the balance tank is the supply of milk (or other product) to be pasteurized, and a supply tank or reservoir by any other name would serve the same function as recited in the claims. A pasteurizer apparatus without its own "balance tank" would still need a supply source, and it is not seen how the Examiner's example would be materially different from the apparatus claimed.

Claims 6 and 18 as amended are believed to overcome the rejection based on 35 USC

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§112, second paragraph. Likewise, Amended Claims 8, 19, and 20 also overcome the rejection based on 35 USC §112, second paragraph.

Independent Claims 1, 11, and 13 have been amended to recite specifically that the UHT heater stage employs a heated liquid medium in a liquid medium to product heater (e.g., a hot-water heater), and to recited that the temperature differential between the liquid medium and the product in the heater is below 20 degrees F at *every* reference point in the heater, rather than just at one point.

Claims 1, 6, 7, 9, 11, 13 and 18 were rejected under 35 USC §102(b) as being allegedly anticipated by McElroy U.S. Pat. 3,567,470. Claims 2 to 5, 12 and 14 to 17 were rejected under 35 USC §103(a) as being allegedly obvious and unpatentable over McElroy, as was Claim 8. Claims 10, 19 and 20 were rejected based on McElroy plus secondary references (Colorado.edu and Examiner's Appendix A). Applicant respectfully questions whether Appendix A ought to be considered as a reference, in that it is not patent nor a printed publication of any sort, and would not explain the thermodynamic action of the *steam* (i.e., vapor phase) heat exchanger 36 of McElroy.

Applicant urges that the invention, as recited in the claims now being asserted, is distinctly different from McElroy and is clearly unobvious over that reference.

A problem that has been present with ultra-high temperature milk processing, i.e., in producing long-life or sterile milk, has been the "cooked" or heat flavor. There have been two approaches to deal with this, with one being that taken by McElroy, namely pulling a vacuum on the milk after it has been sterilized, to draw away the off-flavorants in the vapor. McElroy employs vacuum tank 44 (and also vacuum tank 26) for this purpose. The other approach is to heat the milk to a sterilization temperature (i.e., 280°F to 285°F) as quickly as possible to reduce residence time and hopefully to eliminate burned or scalded tastes. In this approach velocities could reach eighteen feet per second, and can have a large temperature differential between the entering medium and the exiting milk. McElroy follows this procedure, at least in part, and accelerates the product when it passes through the UHT stage (regenerator press 34 and heater

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36) so that the velocity is about three times as fast as when the product passes through the HT regenerator press 12. McElroy uses this high speed to diminish accumulation or backing on [sic, baking on] of solid matters onto the walls of the press (heat exchanger). See col. 4, lines 1 to 7.

The approach taken according to this invention is completely different. Heat is applied gradually to the liquid product, and this permits the process to be carried out with a very high degree of regeneration (i.e., 90 %). The heating medium, i.e., hot water or another suitable heated liquid, entering the UHT heater is only about four to five degrees F above the temperature of the milk exiting (e.g., sterile milk at 280° and hot water at 284°F). With the gradual heating at these low temperature differentials, the milk does not acquire any objectionable "cooked" or scalded flavors.

Also, to keep the milk proteins from depositing or coating the heat exchanger tubes in the upper regenerator and hot water heater, the milk is held at a denaturing temperature for a suitable length of time so that the proteins are stabilized and remain in the milk when it is heated up to the UHT temperature. This eliminates protein deposits so that there are no flow blockages in those stages. The denaturing occurs, as discussed e.g. at page 10, lines 9 to 12, page 11, line 24 to page 12, line 1, and page 12, lines 10 to 16. The milk is held at this temperature (e.g., 175° F) for a sufficient time for denaturing to take place, which depends on the nature of the product. For some typical milk products, the hold time for denaturing can be 60 seconds to 300 seconds. This is longer than the "legal" time (e.g., 15 seconds) required to make the product safe for consumption. (For some products besides milk, e.g., soups or juices, the denaturing step may not be required.)

Unlike the present invention, McElroy uses a steam heater 36 for the final heating of the milk to the sterilization temperature. The steam enters at 300° F as "wet steam" i.e., a minor amount of condensation, but the medium remains in vapor form when it exits the heater 36 and when it passes through the heater 16. McElroy does not contemplate using a hot water heater in place of the heater 36, nor any does McElroy contemplate using liquid as the heat exchange fluid at this stage.

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McElroy does not contemplate the step of denaturing the milk, as recited in the claims asserted here, and instead employs only the legal holding tube 18, with a hold time of only sixteen seconds (col. 2, lines 50 to 59). McElroy instead uses high velocity to keep the product from depositing on the heat exchanger surfaces (col. 4, lines 4 to 8). McElroy does not recognize that gradual heating of the milk (or other liquid food product) would avoid objectionable off flavors, and so McElroy needs to employ two vacuum chambers 26 and 44 to try to pull off the disagreeable flavors (col. 3, lines 19 to 35 and col. 4, lines 35 to 38). These vacuum tanks also have the effect of cooling the milk several degrees by evaporation, which necessitates the steam heater 16, and which significantly reduces the amount of regeneration that can be realized in McElroy's system.

The UHT pasteurization arrangement of the present invention uses lower flow velocities and gradual heating of the product, to produce a finished sterile milk product that does not have an objectionable heat flavor. The step of denaturizing the milk at about 175° keeps the milk protein from settling out in the heat exchanger tubes on its way up through the regenerator and heater. No vacuum tank is needed for removing any "cooked" flavors (an optional vacuum tank can be employed for removing onion flavors, when those flavors would be present in the raw milk - see page 13, lines 13 to 16). In this invention the UHT heater stage has a low temperature differential at the upper temperature end (i.e., sterile milk at 280°F and hot water at 284°F) for gradually heating the milk up to the UHT residence stage 34, 128 or 234). The process results in sterile milk with an acceptable milk flavor and will operate at the lowest requirement for energy input due to the high regeneration, and furthermore the system can operate continuously for over 12 hours without needing to be shut down for cleaning.

The additional references cited by the Examiner do not provide any of the teachings that are absent in McElroy. The Colorado.edu document only shows a coaxial counterflow heat exchanger arrangement, but does not suggest its use in a pasteurizer of this type. Rather, this document's mention of "gas flow" would suggest that its use be in a gas-gas heat exchange system. The Examiner's Appendix A does not make up for McElroy's use of a steam heater 36

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instead, or for McElroy's failure to recognize the advantages of hot water or heated liquid in the heater stage of the present invention. Because of the different thermodynamic effects of vapor and condensed liquid, the two types of heaters would *not* be equivalent.

The cited references fail to show or suggest the invention as specifically recited in Amended independent Claims 1, 11, or 13, including the limitations recited therein, namely, the steps of flowing the liquid food product at the intermediate temperature through a timing tube to hold the product at the intermediate temperature for a predetermined time sufficient for denaturing the proteins in the product, and flowing the liquid food product exiting the second heat exchanger into a liquid medium to product heater, wherein the temperature differential in the heater between the liquid food product and the liquid heating medium at every point of reference in the heater is less than 20 degrees F (claim 1); or flowing the liquid food product at the intermediate temperature through a device to hold the product at the intermediate temperature for a predetermined length of time sufficient for denaturing the proteins therein, and flowing the liquid food product exiting the second heat exchanger into a liquid medium to product heater, wherein the temperature differential in the liquid medium to product heater at every point of reference in the heater is less than 20 degrees F (claim 11); or the step of flowing the liquid food product exiting the regenerative heat exchanger into a liquid medium to product heater in the UHT heater stage, wherein the temperature differential in the medium to product heater between the liquid food product and the heated liquid medium at every point of reference in the heater is less than 20 degrees F (Claim 13).

The dependent claims 2 to 10, 12, and 14 to 20 all depend from claims that are believed to be allowable. In addition, the cited references do not show or suggest a hot water (i.e., liquid medium to product) heater in which the flow ratio is below 3:1 and preferably about 2:1, as recited in Claims 2 and 3; Claim 12; or Claims 14 and 15. The references do not suggest a pasteurization technique in which the temperature differential between the product leaving and the medium entering is about 5 degrees F, as recited in Claim 4 and in Claim 16; where the temperature differential between the product entering the heater and the liquid medium leaving is

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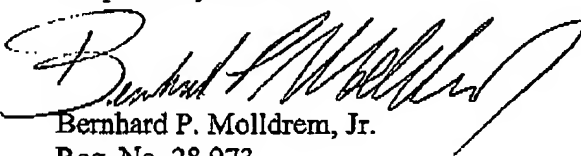
about 15 degrees F, as recited in Claim 5 and in Claim 17; or that the time period for denaturing should be at least sixty seconds as recited in Claim 8. The references, in particular McElroy, do not suggest that a relatively low flow rate should be employed, such as below nine feet per minute (Claim 19) or no greater than six feet per minute (Claim 20).

The references also fail to show or suggest the UHT pasteurizer arrangement as recited in the apparatus claims 21 to 30.

The milk sterilization process depicted and described in the McElroy reference lacks the advantages of this invention in the efficient and effective production of a UHT pasteurized product without objectionable tastes. Moreover, McElroy could not recognize the high regeneration ratio attained in this invention, as the McElroy process would require more energy to operate. In addition, the principle of operation is different, and the McElroy system requires additional elements, e.g., vacuum tanks 26 and 44 and heater stage 16, which are not needed in the embodiments of this invention.

In view of the foregoing amendments and remarks, Applicant respectfully urges that the Claims now being asserted, namely, Claims 1 to 30 clearly define over the prior art, and Applicant requests early and favorable consideration.

Respectfully submitted



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